Karlsruhe Institute of Technology

Institut für Strömungsmechanik
Building 10.23, 6th floor, Kaiserstraße 10, D-76131 Karlsruhe, Germany
http://www.istm.kit.edu

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MSc Project – numerical

Numerical Assessment of Advanced Plasma Actuators

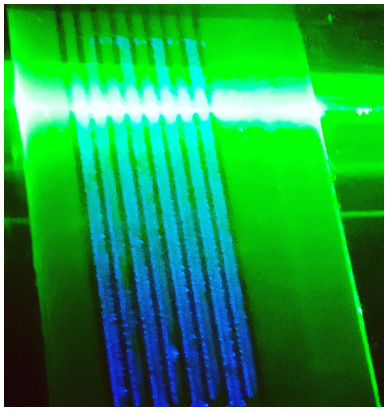
Motivation

Stricter environmental-, acoustic- and anti-pollution regulations push towards more efficient and quiet airborne technology (aircraft wings, wind turbines, propeller blades, air inlet nacelles, etc.). Novel design approaches have been developed to guarantee optimal flow evolution featuring reduced drag and reduced acoustic emissions. The need to extend the operational envelope of these designs led to the adoption of active flow control techniques, where the flow-controlling parameters can be optimally adjusted to a broader variety of flow conditions. Among these devises, alternate current dielectric-barrier discharge (AC-DBD) plasma actuators (PA) are gaining increasing attention from the research community and industry. Advanced designs are currently developed at the ISTM (see picture) and require elaborate designs capable of complex flow-forcing configurations. Such a project requires a multi-disciplinary approach combining experimental investigations, numerical simulations and empirical-theoretical modeling. This project aims at covering the numerical work package of this holistic research project.

Content

Following a thorough state-of-the art survey, the student will implement a numerical model for the advanced plasma actuators developed at the ISTM. This will combine an empirical model (Maden et al. 2013) and experimental data (see e.g. Hehner et al., Physics of Fluids 2019, AIAAJ 2021) with direct numerical simulations, aiming at discerning the complex flow features induced by these novel actuators. This effort builds upon established work and tools developed at the ISTM. Finally, the individuation of the flow-parameter space, where optimal flow-forcing can be achieved, is the final goal of the project.

This project aims at the scientific diffusion of the performed activities. For this reason, the project language is English and knowledge of scientific English is a pre-requisite. There are two positions available on this project.



Starting date:

Ending date:

Student name:

Signature:

Contact persons:
Dr. Jacopo Serpieri,
✉ jacopo.serpieri@kit.edu
Dr. Davide Gatti
✉ davide.gatti@kit.edu
Marc Hehner
✉ marc.hehner@kit.edu
Institute of Fluid Mechanics
Kaiserstraße 10,
Building 10.23, 6^{th} floor,